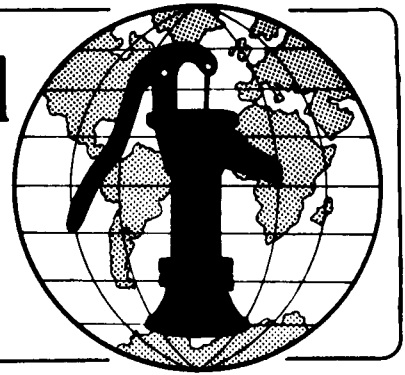


Water for the World

Manufacturing Hand Pumps Locally Technical Note No. RWS. 4.P.6



Many villages need hand pumps but have limited local resources to purchase them. Even when hand pumps are obtained, repair parts may not be readily available. Many communities which have had hand pumps in the past have experienced failure due to the lack of repair parts.

Because of this, there are compelling reasons for local manufacture of hand pumps so that both repair parts and skills are readily available. The alternatives to be considered are village manufacture of pumps which may be inefficient and have a short life-time but are within the villagers' capability to understand and construct and the construction of long-lasting and relatively maintenance free pumps which require skilled workers and sophisticated equipment and must be built in a central location within a country. Another alternative is to have those parts of a pump which require accurate machining or casting made at a central location in-country and to construct the balance of the parts and assemble the pumps at the village level. These methods have been applied with success. The choice of options depend on the specific country and village.

Types of Hand Pumps

To evaluate alternatives, it is necessary to know what a hand pump is and what its component parts are. The most common hand pump is one which uses leverage to enable a person to lift water either by developing a vacuum or by positive displacement or a combination of both. These pumps are classified as shallow well pumps with a maximum pumping depth of 7m, or deep well pumps which can pump from depths

over 7m. Shallow well pumps have the pump cylinder built into the pump stand as shown in Figure 1a. Deep well pumps have the pump cylinder located in the well, below water level. This requires a pump rod in the well. See Figure 1b.

The component parts of a hand pump are a pump cylinder, a drop pipe, a pump rod and pump stand, and a handle.

Pump Cylinder. Pump cylinders may be open or closed as shown in Figure 2. The advantage to an open cylinder is that the plunger can be removed without removing the drop pipe. The pump cylinder must be accurately machined. For this reason, it cannot readily be

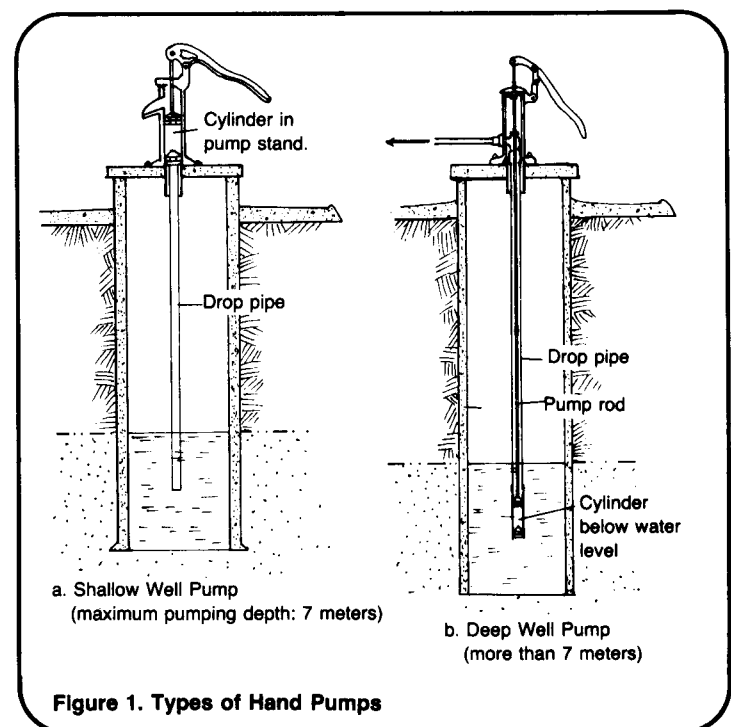
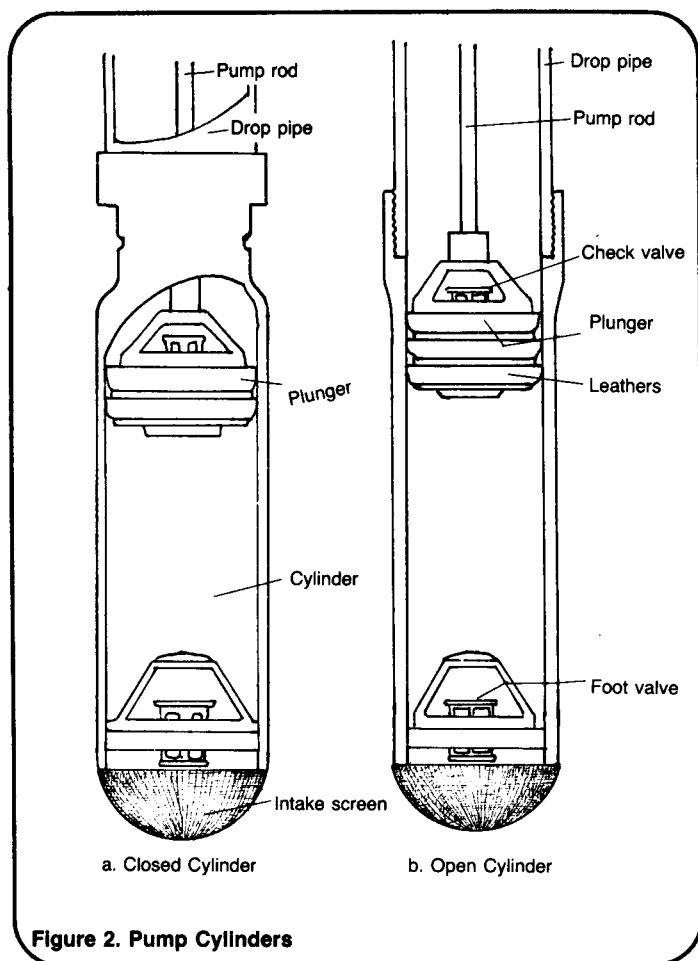


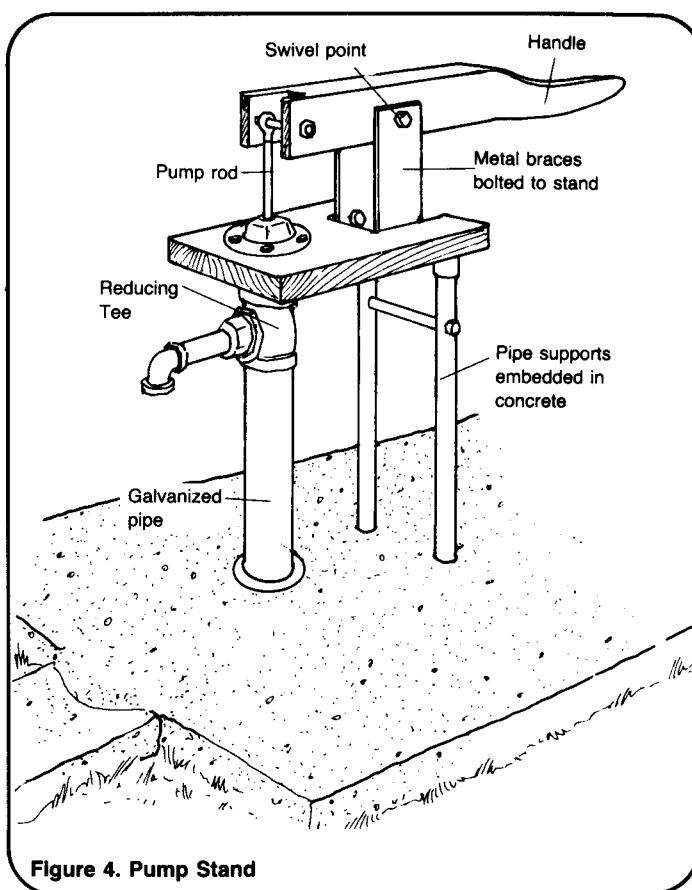
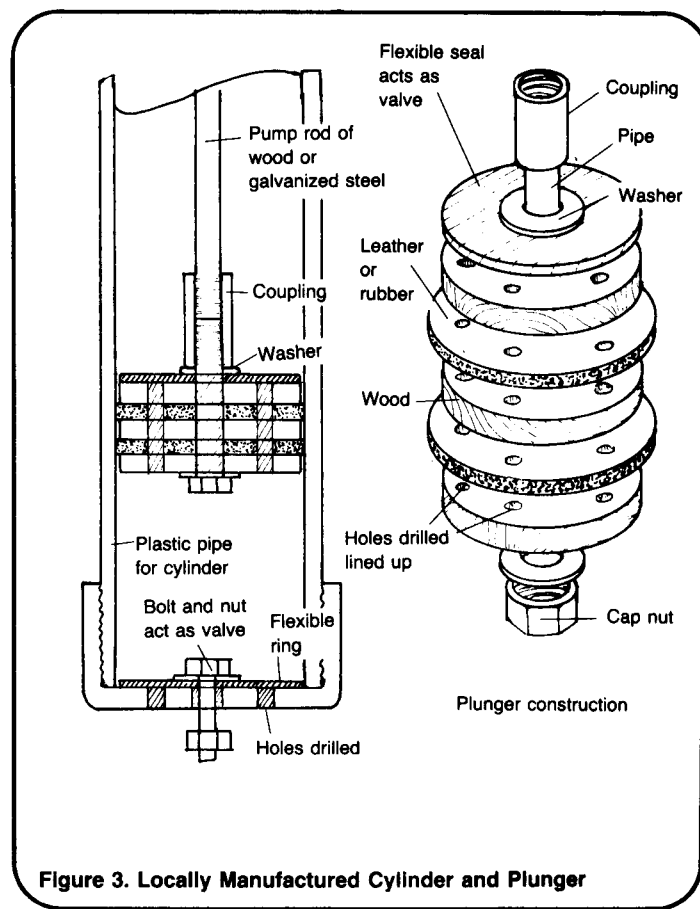
Figure 1. Types of Hand Pumps



constructed at the village level. Some development is underway using plastic pipe for the cylinder but the results are not yet complete. Pump cylinders are available in cast iron and brass. Both have long expected lives. The primary reason for failure is in the "leathers," which are easily replaced and can be made locally. Figure 3 shows a locally made pump cylinder.

Drop Pipe. The drop pipe is usually made of galvanized iron or rigid plastic for shallow depths. Galvanized iron pipe is much more commonly used. Neither can be manufactured at the local level.

Pump Rod. This is necessary for connecting to pump cylinders located in a well. Galvanized iron rod is common for wells up to 30m deep and wood rod for greater depths. These must be obtained from outside the immediate village area in most cases. Wood rod may be used if locally available. Reinforcing steel can be used as a pump rod but it is likely to rust.



Pump Stand. Pump stands may be cast, welded or fabricated from pipe or wood. Since the main points of wear are in the bearing areas, they should be made to close tolerances and of durable material to increase the life of the stand. This primarily involves the pump handle and the pivot point on the stand which supports the pump

handle. The pump stand and handle usually are the first to wear out and are also relatively easy to build. For this reason, they should be considered the principle elements for local manufacture. Figure 4 shows one type of locally manufactured pump stand and handle.